

UNIVERSITY OF COPENHAGEN



Administration costs of agrienviromental regulations empirical work

Huusom, Henrik

Publication date:
2005

Document version
Publisher's PDF, also known as Version of record

Citation for published version (APA):
Huusom, H. (2005). *Administration costs of agrienviromental regulations: empirical work*. Copenhagen: Fødevareøkonomisk Institut, Københavns Universitet. FOI Working Paper, No. 3, Vol.. 2005

Administration Costs of Agri-environmental Regulations

– Empirical Work

Henrik Huusom

E-mail: hh@foi.dk

Abstract

The choice of policy instruments in order to achieve a cost efficient regulation has long been an important topic in the search for solutions to the environmental problems related to agricultural production. To some extent, analyses of the administrative costs incurred in the design, implementation and operative phases of the individual regulations have been neglected. This apparent lack of information on the magnitude and variation of the administrative costs entails a potential for errors in actual policy design.

In the present working paper, a selection of empirical studies on the administrative costs of agri-environmental regulations are surveyed with respect to topic, methodology, data and results. The survey identifies the coverage of empirical studies and uses the results to tentatively indicate the approximate order of magnitude of the administrative costs. Furthermore, the survey identifies some of the determinants of administrative costs in an agri-environmental context.

The survey shows that the administrative costs of regulation can be substantial and that large variations exist. However, the results are difficult to generalise and there is a bias in the material with few studies of the administrative costs of conventional regulations. Still, empirical and theoretical evidence indicate that market-based policy instruments are associated with lower administrative costs than conventional regulations.

Table of Contents

Table of Contents.....	2
Preface	3
1. Introduction	4
2. Background	5
2.1. Concepts and terminology	5
2.2. Determinants - Factors affecting the administrative costs.....	8
2.2.1. Asset specificity.....	9
2.2.2. Frequency, duration and reoccurrence.....	9
2.2.3. Uncertainty and complexity.....	10
2.2.4. Economies of scale	11
2.2.5. Observability and measurability	11
2.2.6. Market structure or other systems of exchange	11
2.2.7. Other determinants	12
3. Survey	13
3.1. Basic issues and considerations.....	13
3.1.1. Objectives	13
3.1.2. Regulatory instruments.....	14
3.1.3. Methodology and data sources	14
3.1.4. Generalisation of results	16
3.2. Individual studies.....	17
Denmark	17
3.2.1. Other Nordic countries	22
3.2.2. Europe.....	28
3.2.3. Other countries	30
4. Main findings and conclusions.....	33
References	38

Preface

The present working paper is written by research analyst Henrik Huusom and surveys empirical work related to the administrative costs of agri-environmental regulations.

Senior research fellows Jørgen D. Jensen and Tove Christensen have participated in the editing process.

Food and Resource Economics Institute

Environmental Economics and Rural Development Division, May 2005.

Henrik Huusom

1. Introduction

Agricultural production potentially leads to environmental degradation and to problems associated with the provision of public goods in terms of landscape amenities, etc. In the last few decades, most countries have introduced different agri-environmental regulations in order to address these problems. Theoretical and empirical studies have been performed to investigate different economic and financial aspects of such regulations, including analyses of the relative merits of market-based instruments and command-and-control measures with respect to cost-effectiveness of control costs. Analyses of the costs of implementing different policies are, however, significantly less frequent, and little effort has been devoted towards quantifying the transaction or administrative costs¹ of individual policies. Where transaction costs are significant compared to the other costs of a given regulation, missing information on the magnitude and variation of the administrative costs entails a potential for errors in actual policy design.

In order to qualify the discussions of the relative merits of different policy instruments, there is a need to consider the magnitude and variations of the administrative costs of different regulations – and not just financial costs of payments, etc., or the compliance costs incurred by the regulated agents. To this end, this paper surveys the methodology, data and results of a selection of quantitatively oriented studies of the administrative costs of agri-environmental policies.

Section 2.1 introduces and briefly discusses the central concepts of administrative costs in an agri-environmental context, and in section 2.2 the determinants of administration costs are identified. In chapter 3, the topics, methodology, data and results of the individual studies in the survey are discussed, highlighting some general aspects. In the main body of the survey, section 3.2, most of the individual studies are briefly described, with the results from a few of the main studies presented in more detail in order to infer some general tendencies regarding the variability of transaction costs and to tentatively identify some main determinants. The studies are grouped according to geography, starting with Danish and Nordic studies. In chapter 4, the main findings and conclusions of the study are presented.

¹ In this paper, the terms 'transaction costs' and 'administrative costs' are used interchangeably even though administrative tasks can be considered to constitute a subset of relevant transactions. When describing the different studies, the terminology used here closely reflects that of the individual studies.

2. Background

2.1. Concepts and terminology

The total costs of a given economic activity can be decomposed into transformation costs – i.e. direct production costs – and transaction costs, cf. Wallis & North (1986). This notion – and with it, the idea that administration costs can be separated from other costs of regulation – can be challenged on conceptual grounds². However, with the approach of this paper, it is assumed that this distinction is indeed possible. Here, the total costs of a given regulation can be decomposed into compliance³ and administrative costs for private agents, whereas the public authorities, etc., incur administrative costs as well as transfer payments, e.g. in the form of subsidies⁴. Compliance costs are the costs incurred by private agents, e.g. in the form of reduced or altered input or output composition in order to comply with the regulation.

The administrative costs of agri-environmental regulation of agriculture are in this paper defined as the costs related to administrative tasks necessary to comply with the intentions and the directives of a given regulation. However, costs attributed to adaptations in the core production activities as a consequence of the regulation – compliance costs – are excluded. In this paper, administrative costs are specifically observed or estimated costs, and are measured by the actual use of resources on administrative tasks implied by a given regulation or a set of regulations.

Some administrative procedures, e.g. related to mandatory manure and fertiliser plans, can be attributed to general management planning related to the operation of the farm, etc., and hence a production cost. At the same time, resources spent on producing such plans may be seen as costs primarily incurred in order to comply with administrative requirements of existing regulation. Also, some administrative costs can be

² E.g. should the use of measuring equipment and meters of a drinking water distribution system be considered to be production costs or transaction costs?

³ E.g. in the form of reduced or altered input or output composition, in order to comply with regulations.

⁴ Another important category of indirect costs of regulations is the distortion costs that arise when tax revenues are raised to finance subsidies etc. Apart from the distortion of relative prices that leads to non-optimal resource allocation, the collection of taxes in itself entails administrative costs; see e.g. Salanié (2003). Distortion costs will not be touched further upon here.

very difficult to attribute to a certain regulation, as is the case for overhead costs for agencies responsible for the implementation and administration of several regulations.

Administrative costs can be thought of as a subset of transaction costs and an additional category of costs to be considered when performing efficiency assessments of agri-environmental policy instruments or projects. In much of the surveyed literature, however, no distinction is made between the terms ‘administrative costs’ and ‘transaction costs’ and the terms are often used interchangeably. In the opinion of this author, the term transaction costs is a more comprehensive and theoretical concept compared to administration costs, even though the distinction between concepts is difficult to execute. Transaction costs can be defined as the costs of using the price mechanism or “*running the economic system*” (Arrow 1969, p. 48), or more intuitively by a comparison to the phenomena of friction⁵. More generally, transaction costs can be thought to comprise the costs of establishing, modifying and transferring property rights⁶. Milgrom & Roberts (1992) separate transaction costs into coordination and motivation costs, referring to the costs of coordinating interactions between different agents, and costs related to the conflicting objectives of the involved agents. The coordination costs stem mainly from the bounded rationality of the agents⁷ and include the costs of bringing the agents together and writing up agreements. Motivation costs primarily arise as a consequence of the risk of opportunistic behaviour or as a consequence of incomplete and asymmetric⁸ information – especially before the agreement is made – and because agents may not always feel obliged to fulfil the terms after an agreement is made.

Furthermore, transaction costs may be distinguished on the basis of the temporal occurrence, where *ex ante* transaction costs include e.g. search, drafting and negotiation costs incurred before the implementation of a regulation. *Ex post* transaction costs include costs related to monitoring and enforcement and possibly renegotiation of agreement terms in the case of e.g. voluntary measures.

⁵ “*Transaction costs are the economic equivalent of friction in physical systems*” (Williamson 1985, p. 19).

⁶ Williamson (1996) distinguishes between transaction costs that arise from the use of the market and transaction costs that arise from internal coordination within the enterprise. According to this distinction, the total indirect costs (as opposed to the direct, strictly production related costs, cf. the distinction between transformation and transaction costs) *governance costs* are composed of (internal) *bureaucracy costs* and (market) *transaction costs*.

⁷ i.e. their limited ability to process information.

⁸ E.g. when the agent has better knowledge of his production costs or capabilities than the regulator.

6 Administration Costs of Agri-environmental Regulations, FOI

Table 1 presents the different administration activities and tasks according to different authors and their temporal distribution. Note that the terminology reflects the type of instrument that is referred to, for example ‘promotion’, ‘bargaining’ and ‘negotiating’ are used in connection to voluntary agreements, etc., whereas terms like ‘enactment’ and ‘prosecution’ reflect mandatory regulations, etc.

Table 1. Administrative costs and implementation stages of regulation

Study	Phase 1	Phase 2	Phase 3
	Preparation	Implementation	Administration/Operation
Dahlman (1979)	Search and information	Bargaining and decision	Monitoring and enforcement
Milgrom & Roberts (1992)	Co-ordination	Co-ordination	Motivation
Stavins (1995)	Search and information	Bargaining and decision	Monitoring and enforcement
Carpentier <i>et al.</i> (1998)	Information	Contracting	Enforcement
Eklund (1999)	Contact	Contract	Control
Falconer & Whitby (1999)	Information, Scheme set-up, Promotion	Contracting	Policing (monitoring and enforcement)
McCann & Easter (1999)	Research, information, meeting and lobbying	Design, implementation	Administration, monitoring, prosecution
Thompson (1999)	Enactment (by legislature)	Implementation (by agency)	Detection and prosecution
Falconer & Saunders (2002)	Negotiation	Negotiation	Ongoing, operational

The different categories are not always clearly defined and certainly not independent of each other. To illustrate the interdependency between different types of costs, consider a situation where *ex ante* transaction costs have been minimised in order to comply with budget restrictions. As a result, the terms of the agreement may be interpreted broadly and this may lead to costly litigation procedures or lack of compliance, effectively increasing monitoring and control costs. The net result may very well be that *ex post* transaction costs are increased by more than *ex ante* costs were reduced.

In the context of agri-environmental regulation of agriculture, *ex ante* transaction costs may be preparatory work for legislation, drafting of voluntary agreements, setting of charges, standards, etc. *Ex post* transaction costs may include the costs of monitoring, control and enforcement; the actual making of payments by agencies in

the case of subsidies, etc.; or the procurement and reporting of relevant documentation by farmers.

Typical administrative tasks of the individual farmers include filling out forms and applications; collection, calculations and reporting of selected data as well as time and other resources spent on e.g. keeping up to date with rules and regulations concerning mandatory as well as voluntary approaches to regulation. In many cases, the use of consultants and auditors will at least partly be initiated by regulatory requirements, etc. Also, the resources spent on lobbying activities by professional organisations, etc. could be argued to be included in the administration costs of a given regulation.

The administrative tasks of the authorities include most of the activities related to the preparation and information about new regulations, drafting of contracts or agreements; designing, distributing and processing applications, decision making, handling complaints; and handling the payments, etc.

There are many linkages between the administrative tasks of the farmers and those of the authorities, and a ‘mirror effect’ can be posited in that e.g. information activities of public agencies have ramifications for farmers’ resources spent on familiarizing themselves with a given set of regulations. Similarly, the care in the provision of timely and accurate data, etc. in filling out applications by farmers will influence resources spent on public agencies’ application processing.

Some studies touch briefly upon the dynamic aspects or the policy life cycle of implementation and administration of regulations. Although the nomenclature is generally not agreed upon, three distinct phases – or rather, parts of the cycle – can be identified. The phases can be labelled preparation, implementation, and the administration or operation phase, cf. Table 1.

2.2. Determinants - Factors affecting the administrative costs

Almost all of the studies discuss the determinants and the variation patterns of administrative costs qualitatively with very few applications of quantitative methods. This bias is attributed to the complexity of the subject along with the frequent observation that often very little and incomplete data exists. The following section presents an overview and general discussion of the factors that determine the magnitude and variation of administrative costs. No universally agreed upon classification of determinants exists. One way of systematically ordering such factors, is to distinguish be-

tween qualitative and quantitative determinants, e.g. referring to number of hectares, number of applications, etc., or degree of specialisation, complexity, etc., respectively. Quantitative and qualitative determinants are listed under headings that refer to the conventional grouping of dimensions in transaction costs economics in the tradition of Williamson (1985, 1991).

2.2.1. Asset specificity

The term is used to capture the idea that the transactions and interactions in the regulation process require the use of highly specialised and specific knowledge, training, equipment, etc. Also, the specificity can refer to the degree to which special features or e.g. scientific interests can be found in an area, for which no apparent substitute exists. In traditional transaction costs economics, the concept is used to describe the extent to which case-specific investments have been made by a party to a transaction. A high degree of asset specificity implies limited scope for alternative uses of a given asset. This situation can lead to contractual problems e.g. of the ‘hold-up’ type, and costly safeguarding measures must be taken to protect the parties from opportunistic behaviour, leading to high transaction costs. In an agri-environmental regulation context, specialised knowledge or equipment for e.g. monitoring and control, or property rights to e.g. locations of special scientific interest or site-specific environmental and natural goods and features, can be interpreted as a form of asset specificity that implicitly entails a premium on administrative costs.

2.2.2. Frequency, duration and reoccurrence

Other important aspects that determine the costs of administration are the regularity of procedures or interactions. E.g. demands for repeated data collection, calculation and reporting, provide training as well as an impetus to adopt cost minimising routines etc. for a regulated agent. Ideally, this leads to decreasing costs per transaction and decreasing transaction costs with time, i.e. the number of years since a policy measure was established. This implies the existence of a learning curve and likely cost savings from fine-tuning and efficiency improvements because of experience gained in earlier stages (e.g. Falconer & Whitby 1999; & Vatn *et al.* 2002, p.43). In case of frequent changes in the regulations, eligibility criteria, etc., administration costs increase.

2.2.3. Uncertainty and complexity

Generally, increases in the degree of uncertainty and the complexity of a given regulation matter tend to increase the administrative costs. In case of uncertainty, more administrative resources are ideally directed towards planning, foreseeing possible contingencies and safeguarding the desired outcome. Relative to a situation with little uncertainty, this situation will tend to increase administration costs. Likewise, a high degree of complexity may demand more input of administrative resources than simple and straightforward regulatory issues. In the context of this study, complexity is *inter alia* reflected in the number of administrative agencies or authorities that must coordinate their work with respect to a given regulation and the amount of technical or legal information that must be processed by e.g. farmers and public agencies⁹. Also, the volume of data that must be collected, processed and reported in order to comply with a given regulation gives some indication of the complexity.

Complexity is also influenced by the educational level and heterogeneity of the regulated agents; the design of the relevant instrument, i.e. principles, definitions and detailed regulations; as well as internal administrative institutions like routines and division of labour or specialisation (Eklund, 1999). The technology available for e.g. monitoring and performing certain administrative tasks will influence administrative costs profoundly, and is a dynamic factor in affecting administrative costs in the future.

Generally, the need for coordination and hence the transaction costs are thought to increase with the number of agents or levels or tiers in a hierarchy, e.g. state, regional or local authorities. However, the resulting effect of a change in a multi-tiered organisational set-up that e.g. involves the deletion or addition of a mid-level tier is not evident from the outset. On the one hand, the inclusion of an additional agency responsible for a share of the administrative task related to a given regulation will in itself increase the administrative burden because of additional operation costs and the increased demand for coordination between agencies on the different tiers and within tiers. On the other hand, the insertion of an additional agency in the regulatory structure may bring about improved coordination and communication between farmers and agencies, or may be able to favourably influence monitoring and control costs, leading to a reduction in over-all administrative costs.

⁹ Falconer & Whitby (1999) use the term 'scheme transparency' to denote this and also mentions the importance of the ease with which management requirements are understood by farmers without the need for professional advice.

The idea of complexity is closely linked to the concept of *connectedness* (cf. Milgrom & Roberts, 1992) that refers to whether or not a given transaction is linked to other transactions. In the case that some information used for the regulation of one aspect is already being systematically collected as a part of another regulation, the connectedness of the two regulations can lead to decreasing administrative costs compared to the case where the regulations are more independent of each other with respect to e.g. reporting of data. Other cases where the connectedness implies increased administration costs because of the need for more coordination can be envisioned, e.g. cases where many, concurrent and intertwining relations lead to a higher degree of trust and forbearance between the parties.

2.2.4. Economies of scale

The mere scale or magnitude of the regulations, especially the number of agents that are influenced and the number of involved agencies, will determine the total administration costs. Also, the number of regulations that affect a given environmental issue and the ensuing administrative tasks will impact on total costs. However, large scale in a given regulation scheme will potentially lead to economies of scale, implying decreasing costs given substantial fixed costs in the organisational set-up and because of the increased scope for specialisation, etc. Similarly, the existence of a learning curve is indicated by some studies, implying that the per transaction costs etc. decrease over time as cost minimising routines etc. are observed in several of the studies.

2.2.5. Observability and measurability

An important category of determinants is the degree to which compliance as well as non-compliance can be observed, and the extent to which e.g. agri-environmental indicators can meaningfully be used to measure progress. Generally, if it is difficult to observe and/or measure relevant factors, there is a need for arranging the regulation in a way that is less dependent on accurate measures. This may imply sacrificing some economic efficiency, i.e. targeting of measures, for some simplicity in the administrative set-up and operation.

2.2.6. Market structure or other systems of exchange

When regulation can be attached to existing market or government structures or other systems for exchange, the additional costs imposed by the new regulation are modest

compared to the establishment of new administrative set-ups. Although this is not normally a concern of transaction costs economics in the tradition of Williamson (1985, 1991), Vatn *et al.* (2002) finds that commodities and services for which a market already exist are much less costly to regulate than e.g. environmental goods that are not linked to any market structures. Therefore, policy measures like environmental taxes on commercially sold fertilizers have relatively low transaction costs, whereas administrative regulations that require a case by case assessment, etc., by perhaps several agencies can be costly in terms of administrative routines. This is also due to differences in the number of access points of regulation; administrative tasks related to a tax on input are isolated to the relatively few supplier or wholesale firms whereas regulation targeting individual firms potentially involves a much higher number of agents, cf. the Danish animal manure handling requirements. Stavins (1995, p. 135) cites an example with refineries and the US EPA leaded gasoline phase-down, where the trading agents (refineries) were already experienced in dealing with each other. This implied minimal administrative requirements and a high level of trading in subsequent market based programmes.

2.2.7. Other determinants

Finally, the following aspects have been mentioned by the authors of some of the studies of this survey to be important factors affecting the level of administrative costs.

- The potential for using e.g. information or GIS¹⁰ technology to provide reliable data and communications quickly and with decreasing costs.
- The attitude of the regulated agents towards the regulation, given its influence on e.g. risk of non-compliance.

The information and promotional efforts by the authorities in the early stages may influence the farmers' knowledge and attitude towards a given regulation, thus affecting the level of compliance and, indirectly, monitoring and control costs.

¹⁰ Geographical Information System

3. Survey

In the first section of this chapter, some general features or questions raised by the survey with respect to the objectives, topics, data sources, methodology, and presentation of the results of the studies are outlined. In the second section, the individual studies are presented in geographical order.

3.1. Basic issues and considerations

3.1.1. Objectives

In most of the studies of this survey, the objective is to estimate the magnitude of the administrative costs of selected agri-environmental policies. In order to illustrate the significance of administrative costs, most studies compare these estimates to other relevant costs connected with the policy in question, i.e. compliance costs, tax revenues, or total subsidies or payments. Frequently, the factors determining the magnitude and variability of the administration costs – i.e. the determinants – are tentatively identified in discussions of the results. The determinants are investigated using theoretical, hypothetical or conceptual arguments. Only a few studies aim at analysing the determinants empirically using econometric techniques, etc.

Studies also differ with respect to their aims at estimating total transaction costs or merely differences in transaction costs when comparing policies (Thompson 1998). The latter case is often the result of limited data availability or is used when the objective is simply to determine the relative merits of different policy instruments. Also, only a few studies make direct comparisons of the administrative costs of different policy instruments aimed at the same environmental problem (McCann & Easter, 1999; Carpentier *et al.* 1998; Thompson, 1999; and – to some extent – Falconer & Saunders, 2001). Although some of the studies set out to investigate running as well as start-up costs, the data material is not good enough to support any conclusions except those of the running costs.

The majority of studies focus on the public costs of administration, whereas private sector administration costs, e.g. filing applications and lobbying by farmers or environmental groups, is the subject of fewer studies. Only a few studies aim at estimating both public and private administrative costs, e.g. Vatn *et al.* (2002).

3.1.2. Regulatory instruments

A traditional way of classifying environmental policy instruments is by dividing them into either administrative¹¹ or incentive mechanisms¹². The latter are sometimes divided into price mechanisms – charges, subsidies, taxes, refunds/deposits – and market or quantity mechanisms such as tradable permits or quotas (Gustafsson, 1999). A third class of instruments is often added, namely policy instruments based on voluntary agreements and information or suasion. In practice, however, the distinction between different instruments is not always clear, in that e.g. voluntary management agreements entailing compensation may be considered to be mere subsidies.

The majority of the studies in the survey analyse voluntary programmes that typically involve some kind of negotiated management agreements. In these programmes, the farmer will agree to adapt his management practices to comply with certain environmental or scientific objectives in return for some kind of monetary compensation. Only a few studies have looked at the administrative costs of traditional command-and-control measures (e.g. McCann & Easter, 1999) and this apparent bias impedes a thorough comparison of the administrative costs of different classes of instruments, e.g. administrative regulation with market based instruments.

A possible explanation for this bias is that agencies involved in policy implementation and administration are often responsible for several concurrent regulations, making a disaggregation of costs to individual regulations difficult. However, when a new programme like voluntary management agreements is introduced, the funding agency will often require that costs be fully accounted for. Thus, costs linked to the introduction of novel singular instruments will generally be easier to identify than policy measures that have evolved incrementally in a complex framework with other similar regulations.

3.1.3. Methodology and data sources

The general approach to estimating transaction or administration costs of agri-environmental schemes is to simply add all costs associated with the preparation, implementation, and operation of the relevant policies. This process often involves identifying the different relevant activities and quantifying them in terms of labour input

¹¹ Alternatively labelled regulatory or command-and-control measures, CAC, like standards, targets, and permissions.

¹² Market based instruments, MBI.

and other resource use – e.g. computer costs and expenses related to printing and distribution of information material – in real or monetary terms. If costs are predominantly quantified in terms of labour input, average salaries or representative wages are utilized to express the resource use in monetary terms.

In order to quantify costs etc., several studies rely on interviews with key persons in agencies relevant for the policy in question for estimates of transaction costs based on information from annual reports, budgets, time accounting systems, etc. This approach is in fact comparable to regular budgeting activities, and can be thought of as *ex ante* assessments of policy implementation costs. Moreover, the key persons that are interviewed for the studies are in many cases the persons responsible for budgeting, etc. (McCann & Easter, 2000), and as such, confidence should be placed in their estimates.

A fundamentally different approach is where transaction costs are calculated as the margin between the buying and selling price of a commodity in a given market. This interpretation – i.e. transaction costs as the financial costs of brokerage services – is used by Stavins (1995) in a theoretical model analysing the efficiency of tradable permit schemes in the presence of fixed transaction costs and constant, decreasing or increasing marginal transaction costs. An example of an empirical study based on a similar methodology is Gangadharan (2000). This approach of course requires the existence of a market for environmentally related goods or services, but has not yet been applied to agri-environmental regulations – e.g. transferable quotas – ,as far as the author of this study is informed.

The most frequent data source of the studies is interviews with key personnel. Often, these interviews are based on or supplemented by information collected from budgets, accounts, audit reports, etc. Costs are in some cases disaggregated to identify costs associated with single or groups of regulations on the basis of best judgements or by using organisation charts or data from time accounting systems (Eklund 1999). A few studies are based on administrative records of individual cases (McCann & Easter, 2000) or on case files, detailing individual transactions such as correspondence, meetings, etc. Time input requirements for these individual transactions are then based on observations from case studies (Falconer & Saunders, 2001). Furthermore, interviews with farmers and/or questionnaires are used to capture the costs of farmers and organisations, e.g. (Vatn. *et al.* 2002) interviewed 4-22 selected farmers about their time input spent on different regulations. In determining private costs, studies like

Vernimmen *et al.* (2000) use questionnaire survey data to establish the resource use from farmers.

Generally, the scope for analyses of administrative costs seems to be restricted by the limited possibilities of establishing a comprehensive data base, as there appears to be no or very little systematic collection of data exclusively for this purpose. Still, possibilities of establishing rough estimates for the administrative costs of introducing novel, singular schemes exist, whereas identification of costs incurred explicitly by a given regulation is problematic, especially if the relevant agency is responsible for other related regulations, as is often the case.

3.1.4. Generalisation of results

In the studies, administrative cost figures are presented in absolute terms, e.g. as the total costs per year, or in relative terms, e.g. as a percentage of total costs or compliance costs; or relative to the total amount of subsidies. For some results, the costs are presented relative to structural factors or similar measures, e.g. per hectare or per participant.

Merely presenting total costs is not very useful for drawing inference about other conditions or about other than the very regulation examined in the study. In order to generalise the results, transaction costs are often shown relative to the compensation payments of the policy, or are indicated as a percentage of compliance costs, total tax revenue, etc. Such a presentation makes the results very sensitive to the levels of payments and their fluctuations, making especially comparison of the temporal variations difficult to track, cf. Eklund (1999).

A presentation of the private administration costs relative to e.g. compliance costs or compensation payments received is not found directly in the relatively few studies attempting to quantify private administration costs. This makes a comparison between relative public and private costs very difficult.

The diversity of the studies in regulatory framework and the variance in cost levels arising from the diversity in countries and traditions, customs, methodological approach, data sources, etc. makes inter-study comparisons or estimate-transfers very difficult. Also, the results are difficult to generalise because of the many variations of policy instruments, agri-environmental schemes, etc., that exist. In some cases, even schemes with similar names – e.g. organic farming aid – are very different in their structures (Falconer & Whitby 1999, p. 81). Furthermore, administrative set-ups and

traditions, general price and wage levels, etc., differ significantly between countries and over time. This makes comparisons of different studies even more difficult and also impedes using specific results as parameter estimates in modelling transaction or administrative costs.

Moreover, a lot of variation exists as to which components of the administration costs to include in the different studies, leading to even less scope for inter-study comparisons of results. To some extent it seems that variable components are easier to identify or account for than fixed costs. This potentially leads to systematic underestimation of the administrative costs of policy instruments for which a large share of the costs are non-variable, and vice versa.

A third category of obstacle to generalisation of the results of the individual studies is the dynamic lag effect that arises when e.g. assessing relative costs. Eklund (1999) cautions that care should be taken when comparing administrative costs to annual payments, as there are often temporal displacements between administrative tasks e.g. application processing and the actual transfer of payments. This potentially leads to flawed estimations of relative costs when viewing payments over short time spans. The same problem arises when the relevant regulation is only in effect for a short time or if schemes evolve and change their eligibility criteria, etc.

In general, the results of the individual studies may indicate some general features of the policy instruments analysed but should be used cautiously, especially in comparisons.

3.2. Individual studies

Denmark

A number of Danish studies have estimated the administrative costs of regulation in an agri-environmental context. Based on a gross simplification, the main Danish agri-environmental regulations can be divided into three main categories:

- Nature, biodiversity and recreation: Typically subsidies and compensated voluntary agreements with eligibility criteria often based on farms' locations in designated zones, e.g. afforestation or sensitive agricultural areas.
- Pesticides: Pesticide tax combined with approval procedures, development and dissemination of information and decision support systems, required documentation and training.

- Nitrogen and other plant nutrients: Primarily administrative regulation based on non-tradable quotas and documentation requirements, technical specifications for equipment, etc.

In Jacobsen *et al.* (2004), public as well as private administrative costs related to the regulation of manure and mineral fertilizer are estimated from interviews with key personnel in relevant agencies based on budgets and accounts information. Also, a simple survey of 50 farmers made by professionals from the Danish agricultural extension service¹³ was performed to give an indication of the farmers' time resource input in order to comply with manure and fertilizer handling regulations. Furthermore, the study estimates the public administrative costs of a list of other instruments of the second Danish Aquatic Programme (VMPII), including a general inspection of agricultural holdings performed by personnel from the technical divisions of the municipalities¹⁴, subsidies for afforestation, establishment of wetlands, and negotiated management agreements in environmentally sensitive areas. The cost estimates are presented as total annual costs and relative to total payments; the latter ranging from 4 to 11 per cent with an average of 8 per cent. The public costs are disaggregated into different government agencies and to the different levels of local government.

Schou (2003) presents estimates of public administrative costs in an analysis of the economic costs of land use changes aimed at protecting groundwater resources from agricultural pollution. He compares the administrative costs of afforestation grants and compensated set-aside schemes based on time and wage estimates from government officials and consultants as well as from annual reports. Administrative costs are calculated from estimated time input use (hours per application by farmers and different agencies, etc.) and standard hourly wages computed in annuities to facilitate a comparison between schemes with different time frames of 5 and 20 years. Results are presented as costs per successful application in budget economic as well as in welfare economic terms in 1997 Danish Kroner (DKK). The administrative costs per application measured in budget economic terms are 1.120 DKK for afforestation grants and 540 DKK for compensated set-aside schemes. In welfare economic terms, the similar figures are 850 and 550 DKK, respectively.

¹³ Dansk Landbrugsrådgivning

¹⁴ The local government/authorities

In an evaluation report of administration of the MVJ-scheme¹⁵ (Amtsrådsforeningen¹⁶ & Strukturdirektoratet¹⁷ 1999), administrative costs and payments of the programme are presented for 1994 and onwards. The scheme includes more than a dozen different management agreements that have 5- or 20-year life spans, and different organisational set-ups were employed in the period, e.g. with respect to the delegation of administrative tasks between central and regional authorities. This makes a clear and unambiguous presentation of e.g. the relative costs of administration difficult. The focus of the study is on the regional administration of the scheme undertaken by the counties, and hence, the presentation of the results to some extent disregards the administrative costs by central agencies; e.g. the costs of monitoring acreage and management practices, etc., by the Plant Directorate, is not included in the cost estimates. The results relate to the number of agreements, the affected acreage, and the volume of the payments as well as the administrative costs of regional and central authorities. Based on selected results from the report, table 2 presents the administrative costs for 1996, 1997 and 1998.

Table 2. Public administration costs per agreement and per hectare and relative to actual payments of the MVJ-scheme, 1996-1998

	1996	1997	1998
Administrative costs, million DKK (Adm.C.)	17.2	20.7	22
Actual payments, million DKK	37.8	50.8	62.2
Adm.C relative to actual payments (per cent)	46	41	35
No. of new agreements	1957	1732	1879
Adm.C. per agreement (DKK)	8789	11952	11708
Area, new agreements (1000 ha)	12	10.5	12.8
Adm.C. per ha (DKK/ha)	1433	1971	1719
Total area under agreements (1000 ha)	52.6	64.7	75.1
Adm.C. per ha, accumulated (DKK/ha)	327	320	293

Source: Amtsrådsforeningen & Strukturdirektoratet (1999, pp. 20-25)

Note: The cost estimates do not include physical on-site inspection, etc., performed by local departments of the central authority the Plant Directorate.

¹⁵ *Miljøvenlige Jordbrugsforanstaltninger*, the Danish programme for voluntary management agreements in environmentally sensitive areas.

¹⁶ Council of Regional Boards

¹⁷ Directorate of Structural Development

Total administration costs range from 17.2 million DKK to 22.0 million DKK from 1996 to 1998, with a share of 5.6 to 6.4 million DKK from the central authority and the balance – some 70 per cent – representing the administrative costs of the counties, i.e. the regional authorities. In table 2, the actual payments made in the relevant year are used to describe the volume of payments, although the report uses various measures in order to describe the monetary flow of the scheme. The administrative costs are reduced from 46 to 35 per cent of the actual payments made from 1996 to 1998.

This is thought to indicate a learning curve, i.e. that cost minimising routines for processing of applications, etc., are being established over time. Another explanation for this development is that the administrative costs relate to both processing applications and making yearly payments for previously established agreements. With long term agreements, a progressively larger share of the payments made in a specific year relate to previously established agreements, and thus a declining share of the administrative tasks concern processing applications, which is assumed to be more demanding in terms of administrative inputs than merely making periodic transfers of payments. Also, the declining share of administrative costs relative to the actual payments made possibly reflects economies of scale in the making of actual payments.

When considering the administrative costs relative to the number of agreements, no learning curve or economies of scale seem to exist. According to the report, this reflects the fact that parallel organisations were established in both central and regional authorities, thereby to a certain extent duplicating the administrative tasks. The same development is revealed in the administrative costs relative to the area under new agreements, which also seems to show some lack of balance between scheme uptake and administrative capacity. However, when considering the administration costs relative to the total area under the scheme, a vaguely declining trend can be observed. This can partly be explained by the idea that these costs are progressively related to the making of payments, whereas the administrative costs per hectare under new agreements mainly are related to the relatively costly – in terms of administrative resources – tasks of processing applications. In sum, the results indicate that the administrative costs of the scheme have been significant relative to the establishment of new agreements as well as – albeit at a declining rate – to the actual payments made. However, the existence of a learning curve or economies of scale is suggested by the declining administrative costs relative to the accumulated area.

The Directorate of Food, Fisheries and Agri-Business (Direktoratet for FødevarerErhverv, 2003) finds similar results for the horizontal measures of the MVJ-scheme in

their mid-term assessment of the Danish implementation of the Rural Development Programme. Although the results presented here can not be directly compared to the results shown in table 2, similar results and trends are observed. A figure of 24.2 million DKK is estimated as the annual administrative costs including monitoring costs causing a generally higher level of relative costs – e.g. per agreement or per hectare – than results from the above study that do not include the monitoring activities of the local departments of the central authority, the Plant Directorate. This implies that the percentage of administrative costs relative to payments is some 54 per cent and the administrative costs per new agreement is almost 12,800 DKK, both figures representing increases relative to the 1996-1998 figures shown in table 2. Conversely, the administrative costs relative to the acreage under new agreements is 1400 DKK per hectare, significantly less than the similar figures in table 2. However, because of differences in the payments indicators, the numbers of these two studies should not be directly compared and no firm conclusions should be made with respect to the trend or direction of the relative administrative costs, and the numbers should merely be used to illustrate the magnitude of the administrative costs and to identify possible determinants of administrative costs.

In a comparison of the relative merits of subsidies for afforestation and a property restructuring approach as instruments for a reduction in non-point source pollution from agriculture, Mouritsen (2004) and Mouritsen *et al.* (2002) present some rough estimates of the per case costs of administration and planning. Costs are presented as a fixed amount per hectare and are based on information from planning professionals from implementing agencies like the National Forest and Nature Agency¹⁸ and the Directorate for Food, Fisheries and Agri-Business. Public transaction costs for administrative and planning tasks are estimated to be 1000 DKK per hectare for the property restructuring instrument, but no information about the specific nature of these tasks is given in the study. For comparison, subsidised afforestation includes an initial payment of 22,000 DKK per hectare and an annual income compensation of 2,600 DKK per hectare for twenty years.

A number of sources for official government estimates of administrative costs exist in the form of annual reports from relevant authorities. Inspection of agricultural holdings with regular intervals with respect to procedures and equipment for the storage and handling of manure, fertilisers and pesticide, etc., is performed by the technical divisions of the local governments (municipalities) in Denmark with the Forest and

¹⁸ In Danish: Skov- og Naturstyrelsen, SNS

Nature Agency as the national authority. The extent of the inspection is detailed in the annual report by the Danish EPA (Miljøstyrelsen, 2004) including the use of, as well as estimates of other costs. Also the annual reports of the Danish Plant Directorate¹⁹ can be used as a source for the costs of monitoring and controlling farmers' mandatory manure accounting, field and fertiliser application plans and pesticide application logs.

3.2.1. Other Nordic countries

Eklund (1999) estimates the public transaction costs of three agri-environmental schemes of environmentally friendly agriculture programmes in Sweden for the years 1996 and 1997. The programmes include measures to preserve bio-diversity, cultural heritage and open landscapes in forested areas. The policies are based on compensated voluntary agreements with respect to special management practices. Results are presented in terms of total transaction costs and relative to the payments. The administrative costs are estimated to be 13.5, 16.5 and 8.3 per cent of the payments made to the farmers, respectively, for each of these measures. The quantitative results are based on financial reports and the time accounting system of the national Swedish Board of Agriculture²⁰ and the regional County Administrative Boards²¹ as well as interviews with key persons in other local and state authorities. In order to compare cost levels, Eklund (1999) presents results from the Swedish Board of Agriculture regarding the administrative costs of a selection of agricultural policy instruments, e.g. livestock and acreage subsidies, support for structural and regional development. These results too are presented as annual total administrative costs and as percentages of total payments.

Table 3 shows that the magnitude of the relative public administrative costs for different types of agricultural programs on the average is around five per cent of the payments to farmers. However, policies in the agri-environmental field are associated with much higher costs, e.g. 13 to 18 per cent.

The estimated costs do not reflect farmers' administration costs which could vary significantly between different policy types, thus ultimately affecting the ranking of total public and private administrative costs.

¹⁹ In Danish: Plantedirektoratet, www.pdir.dk

²⁰ Swedish: Jordbruksverket

²¹ Swedish: Länsstyrelsen

Table 3. Public administrative costs for some Swedish agricultural policy programs, 1996

Policies	Farmer payments (Million SEK)	Administration costs (Million SEK)	Administration as per cent of farmer payments	Administration as per cent of total costs
Arable area pay- ments	3836	103.0	2.7%	2,6%
Animal grants	791	32.1	4.1%	3,9%
Agri-environment policies	645	115.5	18% (1997: 13%)	15,2%
Structure support	670	26.8	4.0%	3,8%

Source: Eklund (1999), p. 54 table 5. Based on data from the Swedish Board of Agriculture (SBA 1997d & 1998d) and own calculations

Table 4 shows the administration costs of three measures as a percentage of transfers to farmers.

Table 4. Administrative costs as percentage of compensation payments, 1997

Type of measure	Farmer payments made 1997 (million SEK)	Administrative costs (million SEK)	Administration costs as a percentage of farmer payments
Open landscape	593	49.3	8.3%
Bio-diversity	216	29.2	13.5%
Cultural heritage	245	40.5	16.5%

Source: Eklund 1999, p. 56, table 7, based on data and estimations from the Department of Economics at the Swedish Board of Agriculture (time accounting systems), FEOGA, time accounting systems at the County Administrative Boards, estimation by key persons at Ministry of Agriculture, the Swedish Board of Antiquities, The National Environmental Protection Board

Eklund (1998, p. 58) estimates the distribution of administrative resources between activities in the different phases of regulation, based on interviews with 10 key persons from some of the 24 County Administrative Boards²². 5 to 10 per cent of the administrative resources are spent on information to the farmers about the measures and the application, while 60-70 per cent is spent on processing the applications. These tasks include entering data, administrative controls, examination of applications and decision-making, etc. And finally, 20 to 35 per cent of the administrative

²² Basing the estimates solely on sources from County Administrative Boards is justified as these boards represent some 70 per cent of total (public) administrative costs according to Eklund (1999 p. 55, table 6).

resources are used in the control phase for monitoring and enforcement. Activities include preparatory work, travelling time, inspections in the field, making decisions and calculating levels of sanction in case of non-compliance.

In sum, the results indicate that most resources spent by public agencies on the administration of voluntary schemes are used on processing applications. Furthermore, considerable resources – up to about one third of total – are spent on monitoring and enforcing the regulations. Only a small proportion – 5 to 10 per cent of the administrative resources – is spent on pre-scheme implementation of information measures to farmers. It can be argued, that more information could lead to resource savings in the processing of applications – fewer mistakes, fewer rejections because ineligibility criteria are known, etc. – and in the monitoring and enforcement because pre-scheme information may lead to increased motivation for complying with agreements, etc. In a more qualitative section, the study examines the determinants of transaction costs by analysing to what extent transaction costs are influenced by the characteristics of the good, the design of the instruments, internal administrative institutions, as well as the frequency and uncertainty of transactions.

Adikhari (2001) cites an unpublished study²³ that estimates private transaction costs incurred by farmers participating in the Swedish agri-environmental programme, based on a survey of 90 randomly selected farmers. Farmers' transaction costs include expenditures for assistance from consultants in agriculture or conservation, mapping, communication costs related to participation, as well as time resource inputs. On average, consultants' costs are reported to account for approximately one-third of the total costs and the individual's labour accounted for approximately two-thirds. Transaction costs, as a share of actual compensation received, are typically around 12 per cent, and private transaction costs have risen over recent years.

Vatn (2002) and Vatn *et al.* (2002) present the results from a survey of the transaction costs of various agricultural policies in Norway. The background of both studies is the costs of targeting policies that involve jointly or complementarily produced public goods, and this trade-off between precision and transaction costs is discussed in relation to the concept of multifunctionality and international trade policies. The focus of Vatn (2002) is the implications of designing efficient incentives for the provision of public goods on barriers to world trade. The actual quantification of transaction costs

²³ Kumm & Drake (1998). The study has not been available for this presentation.

is reported in Vatn *et al.* (2002) that focus on optimal policies when transaction costs are positive and the provision of public goods is linked to agricultural production.

Vatn *et al.* (2002) estimate the transaction costs of eleven different Norwegian agricultural policy measures, including both support and agri-environmental programmes, e.g. environmental taxes on mineral fertilizers and pesticides. Transaction costs are estimated as the total public and private costs in terms of manpower, computers, etc., of the administrative tasks related to each regulation. Tasks include processing applications, handling payments (taxes/subsidies), and some monitoring and enforcement activities. Transaction costs are quantified through interviews with representatives from different public administration agencies, whole-sellers and farmers involved, and include labour costs, general overhead as calculated per man year, computer costs, and costs related to information material and postage.

The analysis is based on a transaction costs perspective as developed by Williamson (1985). However, the authors have modified the approach to better serve the purpose of an analysis of agricultural policies distinct from the manufacturing or production framework, from which the theory originates. Asset specificity²⁴ and frequency are considered to be major determinants of transaction costs, and a special framework is established to categorize the individual measures or policies according to the specificity and frequency of the transactions associated with them. Theoretically, transaction costs of regulations involving assets with high degrees of specificity should be high, whereas the administrative costs of regulations involving frequently reoccurring transactions should be relatively low.

Focus is on running costs, as set-up or establishment costs could not be quantified for lack of data. For policy measures affecting transaction costs at the farm level, a number of farmers – ranging from 4 to 22 depending on the type of instrument – were interviewed for data on farmers' costs. For local government levels, a single county and a single municipality were considered to be representative for the whole group. Transaction costs for the year 2000 are presented as percent of payments to farmers or tax revenue, where applicable. Costs are also presented as costs per unit of the good the payments are attached to, e.g. per hectare and per animal for payments related to acreage or number of animals, respectively.

²⁴ Implying the need for targeting.

Transaction costs for policy instruments like price support (milk etc.) and environmental taxes on mineral fertilizer and pesticides are estimated to be in the range from 0.24 – 12.3 per cent. Similarly, the transaction costs of acreage and livestock payments as well as subsidies for reduced tillage fall within 1- 6.8 per cent of the payments. Corresponding figures for acreage and conversion support for organic farming are from 18.3 to 29 per cent and up to more than 63 per cent if additional monitoring and enforcement procedures are included. The highest relative transaction costs are estimated for support measures aimed at preserving cattle races and special landscape features. These costs range from 54 to 66 per cent and even up to 138 per cent in the case of requirements for additional monitoring. The results vary with the volume of the payments and should be interpreted with care. However, it seems that instruments linked to existing market structures – e.g. tax on commercially sold fertilizers – or to information that is already being collected²⁵ have relatively low transaction costs. Conversely, if policy instruments depend on additional information gathering and monitoring, the administrative costs will constitute a significant proportion of total costs.

Table 5 presents the relative transaction costs of the analysed measures, i.e. the percentage of transaction costs relative to the total transfer payments of each individual measure. An A or B is assigned according to whether or not policies are attached to existing commodities exchanged on the market, implying the degree of asset specificity. An A corresponds to a low degree of asset specificity, and a B indicates that the degree of asset specificity is medium (B1 and B2) or high (B3). Also, numbers 1, 2 and 3 denotes the frequency with which the transaction takes place. A1 indicates high frequencies, A2 and B1 denote medium frequencies, and B2 and B3 signify low frequency of the transactions.

On the basis of a theoretical discussion, Vatn *et al.* (2002, p. 35) analyse qualitatively the levels of different transaction cost components – information, contract and control – and present expected levels of total transaction costs in relative terms. Transactions with increasing degrees of asset specificity imply increasing transaction costs, whereas increasing the frequency of transactions leads to lower transaction costs. From this, the transaction costs of A1 and A2 measures, etc., can be expected to yield minimal to low and low to medium transaction costs, respectively, whereas B1, B2 and B3 measures are expected to yield medium, medium to high, and high transaction costs.

²⁵ E.g. acreage or livestock herd size information for hectare and headage premia.

Table 5. Transfer payments and transaction costs for measured as per cent of payments

Policy instrument	Subsidy/tax (million NOK)	TC as per cent of subsidy/tax	
		Measures A	Measures B
B1 Acreage payments	3267		0.96
B1 Livestock payments	2088		2.29
A1 Price support on milk	520	0.24	
A1 Environmental tax on fertilizers	158	0.09	
B1 Subsidy for reduced tillage	133		6.81
B3 Support for special landscape features	113		53.92
A2 Environmental tax on pesticides	53	1.11	
B2 Acreage support to organic farming	19		18.34-63.3 ¹⁾
B2 Conversion support to organic farming	7		29.04
A2 Price support on home-refined dairy products	1	12.28	
B2 Support for preserving cattle races	1		66.3 – 138.4 ²⁾

Source: Tables 5.26 and 5.27 from Vatn *et al.* 2002, pp. 69-70

Notes: 1) Depending on whether or not control/monitoring of production method is included

2) Depending on whether or not register is included

Table 5 shows that A1 and B1 measures are characterised by relatively low transaction costs and quite large monetary transfers of subsidies or taxes, whereas A2 and B2 (and B3) measures are characterised by significant relative transaction costs as well as smaller transfers. Generally, measures in the A group have lower relative costs of administration than measures or policies in group B, and similarly, group 1 measures are relatively cheaper than measures in group 2 and 3. Cf. chapter 5 for a discussion of the appropriateness of comparing policy instruments on the basis of their relative administrative costs.

Notice the difference between the relative transaction costs of environmental taxes on fertilizers and pesticides – although in the same order of magnitude – seem to be quite significant. This is probably due to the fact that Norwegian pesticide taxes are determined on the basis of environmental and health risk indicators, and thus the applicable tax rate is based on a ranking according to environmental risks. Conversely, a tax on nitrogen fertilizer can more easily be determined if it is on the basis of nitrogen or phosphorous content. In sum, proper determination of pesticide tax rates on the basis of biological risk assessments etc. requires specialised knowledge and additional analyses, i.e. high asset specificity. On the other hand, transaction costs can be considered to be lower in case of an environmental tax based on dollar value or nitrogen content of commercially sold fertilisers, which can be considered readily available in-

formation that requires little or no specialised knowledge or equipment, i.e. low specificity.

Rougour *et al.* (2001) cite the results of a Swedish study²⁶ regarding the administrative costs of a tax on nitrogen fertiliser and reports that these costs were less than 0.8 per cent of the charge revenue. Similarly, Rougour (2001) cites a study²⁷ of an Austrian levy on nitrogen as well as potassium and phosphorous, where administration costs of the full system amounted to 0.7 per cent of revenues. It has not been possible to obtain any description of the data, methodology, etc., of these studies, and the results are therefore considered with some reservations. However, the results of these studies generally correspond well with the findings of Vatn *et al.* (2002).

3.2.2. Europe

Falconer and Whitby (1999) summarise the findings of eight country studies performed under the STEWPOL project, designed to evaluate the administrative costs of individual EU countries' implementation of various agri-environmental schemes. Based on individual studies, the authors estimate the public transaction costs of 37 agri-environmental schemes in the countries²⁸. There are large variations in the actual design and implementation of the regulations in individual countries, so the different results are not easily comparable.

Average annual administration costs of the mid 1990s of the various agri-environmental schemes from each country are presented in the study (Falconer & Whitby 1999, p. 77). When considering the area affected, costs range from 9 to more than 75 ECU per hectare. Per participant, administrative costs range from 140 to more than 1500 ECU, and administration costs constitute from less than 7 to more than 87 per cent of the compensation payments. For ease of comparison, Falconer and Whitby (1999, p. 78) present results from other studies to illustrate the relative magnitude of transaction costs of agricultural commodity regimes, e.g. arable area or set-aside and livestock payments, in Germany, Sweden and the UK. Administrative costs of arable area payments range from 0.8 to 4 per cent of total public scheme costs, while similar figures for payments related to livestock fall within the range from 2.5 to 20 per cent. Furthermore, results displaying the magnitude of transaction costs related to time

²⁶ Jonsson *et al.* (1997). The study has not been available for this presentation.

²⁷ Hofreither & Sinabell (1998). The study has not been available for this presentation.

²⁸ Austria, Belgium, France, Germany (in Saxony, Bavaria and Schleswig-Holstein), Greece, Italy, Sweden and Northern England.

frame – i.e. years since scheme implementation – as well as number of participants are presented in the study, indicating the existence of economies of scale as well as a learning curve, implying that the administration costs of policy schemes will tend to decrease over time, *ceteris paribus*.

Also, Adhikari (2001, pp. 13-14) refers to another unpublished study²⁹ under the STEWPOL project aiming at determining the causes of participation of farmers in agri-environmental programs in eight EU states. The study outlines a theoretical econometric participation function related to variables like the direct resource costs of conservation, the direct utility of the farmer derived from conservation activities, and the transactions costs borne by farmers in relation to participation. Transaction costs borne by farmers in relation to schemes might pose constraints on participation. Information-gathering, for example, on the economics of converting to organic farming and how to change management practices, can be a key component of the transactions costs incurred by farmers wishing to participate in conservation schemes.

Falconer (2000) also considers the extent to which farmers' transaction costs constrain the rate of participation in voluntary agri-environmental schemes in the selected EU member countries. The study is based on data collected for the STEWPOL project reported by Falconer & Whitby (1999), and discusses and suggests measures to reduce private transaction costs and thereby improve scheme uptake.

Falconer & Saunders (2001) compare the total costs – transaction costs and compensation – of individually negotiated and standard management agreements under the Wildlife Enhancement Scheme for Sites of Special Scientific Interest in England. Public and private transaction costs are estimated on the basis of a range of case study agreements. The study aims at quantifying total costs of different approaches to voluntary compensated site-specific management agreements. The results indicate that better targeting by individually negotiating agreements, although costly in the initial phase, can lead to a reduction in monitoring costs, and hence can be less costly than standard agreements when the full policy life cycle is considered.

Vernimmen *et al.* (2000) employ cross-section farm survey data to investigate farmers' decisions regarding administrative tasks based on questionnaires from 385 representative Belgian farmers. The study quantifies the number and type of regulations faced by the farmers as well as indicates the farmers' time input use (in labour hours

²⁹ Drake *et al.* (1999). The study has not been available for this presentation.

per year) on selected administrative tasks pertaining to individual regulations, e.g. accounting, fiscal declarations, manure regulation, permits, CAP, and environmental programmes. For example, administrative tasks related to manure regulations were applicable for 139 out of 385 farmers, corresponding to 36 per cent, while 18 percent of the surveyed farmers performed administrative tasks related to environmental regulations. Of these, around 50 per cent used 2 hours or less per year on the tasks, while a quarter of the farms spent from 2 to 5 hours per year. Around 18 per cent of the farms spent between 5 and 20 hours per year on administration related to voluntary environmental programmes, and finally, some 7 per cent had an annual time resource input of more than 20 hours. These figures can be compared to time spent on accounting regulations, where half of 290 applicable respondents state that they use more than 20 hours each year to comply with administrative requirements. Based on a transaction cost economics perspective, the study uses an econometric probit model to estimate the impact of decision factors like the complexity and frequency of the administrative tasks on the probability of the farmers deciding to outsource all or parts of their administrative tasks. The study concludes that the farmers' decisions whether or not to outsource paperwork depend on the complexity and the uncertainty about a positive outcome of the underlying regulations as well as on the reduction in time spent by the farmer on various administrative tasks.

In Mann (2002) the concept of administrative elasticity – the monetary volume of transfers linked with the administrative costs of a programme – is adapted to agricultural policies, and then applied to the administration of German export subsidies.

OECD (2003, p. 93) compares the administrative costs for negotiated agreements and tradable permit schemes, and indicates that while the set-up costs may be significantly higher for tradable permit schemes than for negotiated agreements³⁰, the operating costs of a well functioning tradable permit scheme can be very low.

3.2.3. Other countries

McCann & Easter (1999) estimates and compares the transaction costs of four different policies for the reduction of agricultural phosphorous pollution in the Minnesota River. The objective is to determine whether transaction costs help explain the prevalence of actually observed policies and to identify determinants of environmental pol-

³⁰ Although very low establishment costs for negotiated agreements may lead to less suitable agreements – in the sense that the risk of moral hazard etc. can increase the need for (and hence the costs of) monitoring or that ambiguity in the wording of the agreements may imply expensive litigation.

icy related transaction costs. Estimates of public costs incurred under the four scenarios are based on in-depth interviews with government officials and from questionnaires to relevant agencies. The estimated labour requirements of staff are translated into monetary terms using average salaries, and recurring costs are discounted at a rate of 5 per cent over a 10-year period. Results indicate that in terms of transaction costs the cheapest way to achieve the objective of reducing phosphorous pollution of the Minnesota River is to levy a tax on phosphorus fertilizer (0.9 million \$), whereas the use of permanent easements under the RIM programme (an administrative regulation) entailed transaction costs of 9.4 million \$. The other policy measures – requirements for conservation tillage (7.9 million \$) and an information-based measure as the improvement of the agricultural extension service (3.1 million \$) were given intermediate ranking with respect to transaction costs.

Another study by the same authors (McCann & Easter, 2000) analyses the magnitude of public sector transaction costs of the US Natural Resource Conservation Service (NRCS) programmes. The study aims at identifying the determinants of transaction costs by regression analysis of the relationship between transaction costs, abatement costs, region and type of conservation practice. Administrative costs are calculated from time estimates obtained from interviews multiplied by average salaries. Other costs are drawn from NRCS agency records of agreements where a conservation practice had been installed with public sector involvement in the form of cost-share (subsidy) and technical assistance. These records detailed conservation practices and public implementation, and public and private conservation costs. The study estimates total conservation costs per acre to be \$32.84, of which public (not just NRCS) transaction costs constitute 38 per cent and public and private abatement costs the remaining 62 per cent. The transaction costs are found to increase with abatement costs and vary according to region and conservation practice.

Carpentier *et al.* (1998) analyse transaction and compliance costs of reducing nitrogen runoff from farms by 40 per cent, using perfectly targeted and uniform performance standards. Transaction costs are estimated by identifying and budgeting³¹ costs of activities required to target and enforce nitrogen runoff reductions. Activities include initial activities and costs to collect information, contract with the farmer and to enforce³² the agreement for each regulatory standard as well as the activities and costs to update the implementation each year over a ten-year horizon.

³¹ Using standard hourly rates of farmers, agronomic experts and lawyers

³² Enforcement costs do not include litigation in this study

Thompson (1999) presents an institutional transaction costs framework for public policy analysis and demonstrates its use by comparing transaction costs and compliance costs from a non-tradeable effluent limit permit system with effluent charges to control water pollution from American textile mills. Based on readily available statistics, rough estimates from government and industry officials, and drawing on German experiences with an effluent charges system, differences in transaction costs and compliance costs between the two water quality policies are estimated. Costs are divided into enactment incl. lobbying by industry and NGOs, implementation, and detection and prosecution costs. The study shows that transaction costs are significantly smaller for the charge systems. The inclusion of transaction costs in the policy analysis, however, did not change the optimal policy choice as given by a conventional cost-benefit analysis.

4. Main findings and conclusions

The literature shows that transaction and/or administration costs for both public agencies and private agents are important components in the over-all costs and transfer payments linked to agri-environmental regulations. Furthermore, it has been found that administrative costs may constitute significant proportions of the other costs or payments involved in a given regulation, e.g. tax revenues or subsidies. These relative administrative costs – e.g. administration costs as a percentage of total costs or total transfer payments – serve as an intuitive indicator of the relative merits of different policies. There is, however, no (easy) way to point towards a theoretically underpinned concept for measuring and assessing the relative costs. And a policy instrument that implies relatively high administrative costs may be preferred if the associated compliance costs are relatively low and the proper incentives are provided, rendering the use of the instrument cost efficient compared to others. Also, assessing policy instruments on the basis of relative administrative costs will yield misleading results when comparing e.g. revenue generating taxes with regulations that do not entail any payments.

The relative magnitude of public transaction costs falls within a very wide range in the studies covered in this paper – from less than 1 per cent of total tax revenue in the case of a levy on nitrogen fertiliser (Rougøor *et al.* 2001) to almost 140 per cent in a Norwegian programme for the preservation of cattle races (Vatn *et al.* 2002). The upper bound of this range is virtually limitless in cases where the actual compensation payments, etc., are very low; especially if only the short run – e.g. within a single year – is considered as in the case of English organic aid schemes in 1994, where administrative costs totalled 91 per cent of total costs, and no agreements were finalised that year (Falconer & Whitby, 1999).

The Vatn *et al.* (2002) study uses transaction costs relative to transfer payments as an indicator of policy efficiency. This approach means, however, that the results are difficult to generalise to policies that do not involve payments. Furthermore, merely focusing on the relative transaction costs as the indicator of efficiency in a context of policy analysis may lead to flawed conclusions with respect to instrument choice. In these circumstances, the sum of transaction costs, transfer payments as well as compliance costs is the proper indicator to be used. Plus of course, ideally some kind of quantification of the expected or realised benefits of the individual modes of regulation should be included in an analysis of the relative merits of different policies.

However, the compliance costs and benefits of various policies are difficult to quantify for lack of data and even conceptually. Furthermore, even many of the direct costs of regulation are not easily identified from accounts, etc., as there are no universally accepted conventions as to accounting for them. In sum, when respecting its limitations, the concept of relative transaction costs can serve as a useful indicator of the relative advantages of different policies and may point towards general determinants of transaction costs in the individual policies.

If information is collected regularly as an integral part of other regulations, this process emulates an attachment to market conditions and low asset specificity, and hence, relatively low expected transaction costs. Examples of this situation are reporting of field size for property tax purposes or crop rotation for manure and fertiliser accounting, or declaration of price and quantity data for company tax or trade statistics purposes. If policies or measures can be attached to commodities or existing market structures, the administrative/transaction costs are relatively low compared to the total (financial) costs indicated by the total volume of subsidy or the tax revenue. This result is in accordance with what would be theoretically expected, as the attachment to market structures implies a low degree of asset specificity, and hence low transaction costs. If, on the other hand, the transaction of the regulation is characterised by a high degree of asset specificity, a special and costly system has to be implemented.

The volume of payments related to each individual measure indicates to some degree the extent to which efficient administrative routines have been developed, and in this respect the existence of a learning curve. The volume of payments provides in itself a clear incentive to establish cost-minimising and efficient procedures for handling applications and transfers of payments, etc. Another explanation of the relatively low percentage of administrative costs is the existence of economies of scale related to the handling of taxes and/or subsidies.

The frequency and reoccurrence of the individual administrative tasks seem to be important determinants of transaction costs. This is probably due to agents acquiring the necessary skills and know-how and establishes cost-saving routines, parallel to the speculations above. Requirements for special monitoring and enforcement routines increase transaction costs. E.g. documentation records with respect to preservation of certain cattle races or a verification of organic production methods can lead to increased monitoring and enforcement costs that may cause a doubling and even a tripling of total transaction costs. More generally, administrative costs increases with the extent to which measures are dependent on some kind of specialised knowledge,

inspection efforts, etc., implying a high degree of asset specificity. Moreover, quantitative indicators such as the volume of payments and the frequency or reoccurrence of transactions constitute efficient incentives to establish cost-minimising administrative routines and to 'quickly climb up the learning curve'. This may lead to quite small relative transaction costs (as percentage of associated payments) or to declining costs per transaction.

It is important to recognise that the private sector is not a homogenous group but comprises individual farmers as well as different suppliers, etc., that are influenced differently by different regulations. In the case of an environmental tax being levied on e.g. pesticides, wholesalers and retailers may face additional administrative tasks, whereas the individual farmers will probably not incur additional administrative tasks because of the tax. Conversely, in the case of mandatory pesticide application journals, the administrative burden is placed on the individual farmers, leaving suppliers, etc., unaffected.

There are many empirical and theoretical obstacles to comparing the results of different studies and transferring them to other analyses. This is partly because there is no universally agreed upon definition of transaction costs, and different studies thus include different components. Also, there is no common yardstick for assessing the magnitude of transaction costs.

A survey of the empirical literature on transaction and administrative costs does not provide any conclusive evidence of the relative administrative costs of different policy instruments. Nonetheless, a few studies have indicated that market-based instruments may be characterised by a potential for lower administrative costs than those of detailed regulations of a command-and-control type for similar environmental issues. Also, in some of the surveyed literature, more theoretical arguments indicate that regulations based on existing market structures tend to be characterised by relatively low administrative costs.

A general impression from surveying empirical evidence and more theoretical studies is thus that the transaction and/or administrative costs of market-based instruments are generally quite low compared to similar costs associated with voluntary agreements and administrative regulations. However, the survey has been able to cast very little light on the administrative costs of conventional administrative regulations. The reasons for this are not clear, but it probably stems from the gradual evolution of e.g. the legal complex and the multitude of regulatory tasks performed by the authorities

and the implicit difficulties in isolating the administrative input into separate regulations. Another contributing factor can be that some kind of evaluation procedure involving administrative efficiency, etc., is a mandatory component in many novel schemes, e.g. voluntary management agreements.

Theoretically, the notion that the degree of asset specificity determines transaction costs to a significant extent supports the conclusion that the administrative costs of market-based instruments are lower than those of conventional administrative regulations. Traditional regulations in the form of specified rules and standards often imply highly specialised procedures or equipment and personnel with a good knowledge of detailed and specific circumstances regarding the environmental problem as well as technical solutions, etc. To the extent that these aspects can be said to involve a higher degree of technical, human or other forms of asset specificity, it may be inferred from transaction costs economic theory (cf. Williamson 1985, 1996) that administrative regulations potentially entails significant transaction costs compare to market-based instruments. This conclusion is also supported by e.g. the findings of McCann & Easter (1999), where the administrative costs of various solutions to phosphorous pollution in the Minnesota River – e.g. extension measures and voluntary management agreements – are estimated to be from more than 3 times to almost 10 times as expensive as a tax on fertiliser. Similarly, Thompson (1999) finds that the administrative costs of effluent charges are significantly lower than the similar costs of a system of non-tradable effluent limit system for regulation of water quality.

However, this tentative conclusion does not imply that market-based instruments are superior³³ to other instruments in all situations, even though efficiency arguments in favour of market-based instruments can be produced as well. The reason for this is that economic instruments are only applicable to certain types of environmental problems; most notably where some form of market for environmental goods or services exists. In many other cases, especially where specific locations are involved or highly specialised knowledge or operations is imperative in handling the relevant problem, other forms of regulation must be used in order to better comply with the objectives of the regulator.

The majority of the studies analyse various voluntary agri-environmental schemes, typically involving adopting specified management practices. However, it is not obvious what ranking such measures should be given with respect to administrative costs

³³ With respect to minimising administrative as well as total costs.

compared to other policy instruments. Falconer & Whitby (1999) claim that even though data are limited, it appears that voluntary agri-environmental schemes are generally more costly to administer compared to other policy types, e.g. commodity regimes for farm income support. In contrast to other policy types, this is mainly because voluntary agri-environmental schemes involve direct interaction with farmers at all stages. Vernimmen *et al.* (2000) observe that the participation of farmers in voluntary environmental programmes is relatively non-costly in terms of labour input as the conditions of the agreement are fixed and given by the authorities, and do not involve any time-consuming optimisation procedures by individual farmers. This is probably not true for all similar regulations, but will depend on the design of the actual scheme and the administrative set-up, etc. Voluntary or negotiated agreements constitute a very heterogeneous group of policy instruments, and it does seem difficult to point towards general results with respect to the administrative costs.

References

- Adhikari, B (2001): Review of Common Pool Resource Management in Tanzania, Literature Review on the Economics of Common Property Resources. Report prepared for NRSP Project R7857. Environment Dept. University of York. Draft, February 2001.
- Amtsrådsforeningen & Strukturdirektoratet (1999): Evaluering af Administrationen af de Miljøvenlige Jordbrugsforanstaltninger (MVJ). December 1999.
- Arrow, K (1969): The Organization of Economic Activity: Issues Pertinent to the Choice of Market Versus Nonmarket Allocation. In *The Analysis and Evaluation of Public Expenditure: The PPB System*. Vol. 1. U.S. Joint Economic Committee, 91st Congress, 1st Session. Washington, DC: U.S. Government Printing Office.
- Carpentier, C L; D J Bosch & S S Batie (1998): Using Spatial information to Reduce Costs of Controlling Agricultural Nonpoint Source Pollution. *Agricultural and Resource Economics Review*, April 1998, vol. 27, (1), pp. 72-84.
- Dahlman, C J (1979): The Problem of Externality. *Journal of Law and Economics*, vol. 22 (1), pp. 141-162.
- Direktoratet for Fødevarerhverv (2003): Midtvejsevaluering af det danske landdistriktprogram. Delrapport vedr. MVJ-ordningerne, Økologi og Demonstrationsprojekter udarbejdet af Kvistgård Consult, 19.december 2003.
- Drake, L, P Bergstrom & H Svedsater (1999): Farmer's Attitude to and Uptake Countryside Stewardship Policies. Draft Final Report to the STEWPOL Project, Chapter 5, FAIR1/CT95/0709, University of Uppsala, Sweden.
- Eklund, A (1999): Transaction Costs of the Swedish Agri-environmental Program. Swedish Agricultural University, Institute of Economics, report no. 128.
- Falconer, K. & M Whitby (1999): The Invisible Costs of Scheme Implementation and Administration. In: Van Huylenbroeck, G. and Whitby, M. (eds.), *Countryside stewardship: farmers, policies and markets*, Pergamon, pp. 67-88.
- Falconer, K & C Saunders (2002): Transaction costs for SSSIs and policy design. *Land Use Policy* vol. 19 (2002), pp. 157-166.
- Falconer, K (2000): Farm-Level Constraints On Agri-Environmental Scheme Participation: A Transactional Perspective. *Journal of Rural Studies*, vol.16 (2000), pp. 379-394.
- Gangadharan, L (2000) Transaction Costs in Pollution Markets: An Empirical Study. *Land Economics* 76 (4), pp. 601-14.

- Gustafsson, B (1998): Scope and Limits of the Market Mechanism in Environmental Management. *Ecological Economics*, vol. 24 (1998), pp. 259–274.
- Jacobsen, B H., J Abildtrup, M Andersen, T Christensen, B Hasler, Z B. Hussain, H Huusom, J D. Jensen, J S. Schou & J E Ørum (2004): Omkostninger ved reduktion af landbrugets næringsstofftab til vandmiljøet – Forarbejde til Vandmiljøplan III [Costs of Reducing Nutrient Losses from Agriculture - Analyses prior to the Danish Aquatic Programme III]. Fødevarøkonomisk Institut, Rapport nr. 167, København.
- Jonsson, O, K Löfgren, S Nyström & I Vilborg (1997): Environmental Taxes in Sweden – Economic Instruments of Environmental Policy. Swedish Environmental Protection Agency, Stockholm.
- K-I Kumm & L Drake (1998): Transaction Costs to Farmers of Environmental Compensation. Unpublished report, Department of Economics, Swedish Agricultural University (SLU) University of Uppsala, Sweden.
- M F Hofreither & F Sinabell (1998): The Australian levy on mineral fertilizers—selected observations. In: L. Gazzola & K. de Roest (1998) *Proceedings of Workshop: Economic Instruments for Nitrogen Control in European Agriculture (Nitrotax)*. Reggio Emilia, Research Centre on Animal Production (CRPA).
- Mann, S (2002): The Concept of Administrative Elasticity. *International Journal of Public Administration*, vol.25 (8), pp.1007–1019.
- McCann, L & K W Easter (1999): Transaction Costs of Policies to Reduce Agricultural Phosphorous Pollution in the Minnesota River. *Land Economics*. August 1999 vol. 75 (3), pp. 402-414.
- McCann, L & K W Easter (2000): Estimates of Public Sector Transaction Costs in NRCS Programs. *Journal of Applied and Agricultural Economics*, December 2000, vol. 32 (3), pp. 555-563.
- Milgrom, P R & J Roberts (1992): *Economics, Organization, and Management*. Prentice Hall, New Jersey.
- Miljøstyrelsen (2004): Miljøtilsyn 2002 – Sammenfatning af kommunernes, amtskommunernes, Miljøstyrelsens og Skov- og Naturstyrelsens miljøtilsyn i 2002. Orientering fra Miljøstyrelsen, nr. 12, 2004.
- Mouritsen, A K M (2004): Property Restructuring in Denmark – a Method for Achieving the Objectives of Environmental Protection and Cultural Heritage. *Nordic Journal of Surveying and Real Estate Research*, vol. 1, 2004. Pp. 44-56.
- Mouritsen, A K M, J K Staunstrup & E M Sørensen (2002): Property Scenarios 1998-2018 in Denmark. *Geografisk Tidsskrift/Danish Journal of Geography*, Special Issue 3, 2002. Pp. 87-95.

- OECD (2003): Voluntary Approaches for Environmental Policy – Effectiveness, Efficiency And Usage In Policy Mixes. Organisation for Economic Co-operation and Development, Paris.
- Rougoor, C W, H Van Zeijts, M. F. Hofreither & S. Bäckman (2001): Experiences with Fertilizer Taxes in Europe. *Journal of Environmental Planning and Management*, 44(6), pp. 877–887.
- Salanié, B (2003): *The Economics of Taxation*. The MIT Press. Cambridge, Massachusetts.
- Schou, J S (2003): Miljøøkonomisk analyse af skovrejsning og braklægning som strategier til drikkevands-beskyttelse. Danmarks Miljøundersøgelser, Miljøministeriet. Faglig rapport fra DMU, nr. 443.
- Stavins, R N (1995): Transaction Costs and Tradeable Permits. *Journal of Environmental Economics and Management*, vol. 29 (2), pp. 133-148.
- Thompson, D B (1999): Beyond Benefit-Cost Analysis: Institutional Transaction Costs and Regulation of Water Quality. *Natural Resources Journal*, vol. 39 (3), pp. 517-541.
- Thompson, D B (1998): The Institutional Transaction Cost Framework for Public Policy Analysis. Mimeo. Department of Agricultural and Applied Economics, Virginia Tech. 20. May 1998.
- Vatn, A (2002): Multifunctional Agriculture: Some Consequences for International Trade Regimes. *European Review of Agricultural Economics* Vol. 29 (3) 2000, pp. 309-327.
- Vatn, A, V Kvakkestad and P K Rørstad (2002): Policies For Multifunctional Agriculture – The Trade-off between Transaction Costs and Precision. Agricultural University of Norway, Department of Economics and Social Sciences, Report no. 23.
- Vernimmen, T, W Verberke & G van Huylenbroeck (2000): Transaction Cost Analysis of Outsourcing Farm Administration by Belgian Farmers. *European Review of Agricultural Economics*, vol. 27(3), pp. 325-345.
- Wallis, J J & D C North (1986): Measuring the Transaction Sector in the American Economy: 1870 to 1970. In S.L. Engerman & R.E. Gallman (eds): *Long Term Factors in American Economic Growth*, Studies in Income and Wealth. University of Chicago Press.
- Williamson, O E (1985): *The Economic Institutions of Capitalism – Firms, Markets and Relational Contracts*. Free Press, New York.
- Williamson, O E (1991): Comparative Economic Organization: The Analysis of Discrete Structural Alternatives. *Administrative Science Quarterly*, Vol. 36 (2), pp. 269-296.

Williamson, O E (1996): The Mechanisms of Governance. Oxford University Press.